

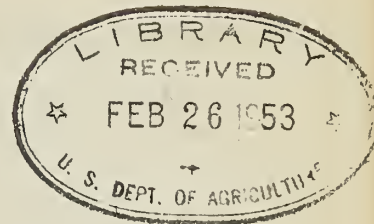
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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SUMMARY REVIEW OF MONTHLY REPORTS¹
FOR
SOIL CONSERVATION SERVICE RESEARCH²
JUNE 1952



EROSION CONTROL PRACTICES DIVISION

Soil Erosion Practices - G. N. Sparrow, Tifton, Ga.

"Corn suffered badly for lack of rain during the month. It was noted that the corn which was preceded by Blue lupine showed little damage from drought, whereas corn following oats and crotalaria and corn not preceded by a winter legume showed definite damage from drought. The Blue lupine was plowed under, while the oats stubble and crotalaria were disked into the ground and not plowed.

"Other crops showed little detrimental effects of drought. Grasses, of course, did not grow as vigorously as might have been expected under better weather conditions.

"The development of grasses in the area devoted to grass-based cropping systems was observed closely. Coastal Bermuda grass is growing nicely and in an almost perfect stand. Pensacola bahia grass is coming along, but in a rather spotty stand. Further observation is required to determine whether the stand and growth is adequate to develop into satisfactory cover. Argentine bahia grass is even more spotty in its stand than the Pensacola bahia, but individual plants have attained taller growth in most cases than those of Pensacola bahia grass.

"It seems rather significant that the Coastal Bermuda grass has attained such excellent growth. The grass was planted in late November, whereas the usually recommended time of planting is in the spring and summer. If fall planting proves dependable, it will enable farmers to plant the grass at a time when they are not normally involved in other crop work. In this study of cropping with grasses Coastal Bermuda grass will be planted each fall, thus providing annual observance of the feasibility of fall planting.

"The slow development of the bahia grasses imposes a possible criticism of the study. There will be sufficient native grasses in the areas delegated to bahia to provide grazing, but the bahia will not predominate before early fall. At best, then, the area will be covered with a satisfactory sod of bahia grass only during the second year of growth of the grass. Since areas are not designated for but 2 years in grass, the actual benefits of the bahia will be felt but 1 year. Therefore, it seems a bit doubtful as to whether a 4-year cropping system with grasses and row crops is long enough to get full benefit from the grasses involved."

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²All research work of the Soil Conservation Service is in cooperation with the various State experiment stations.

Trials with a Rotary Mower - B. H. Hendrickson, Watkinsville, Ga.

"Chancellor wheat was sown in the fall of 1951, using two different methods of seedbed preparation, on Class IIe Cecil sandy loam cropland following cotton and corn harvest. Where the wheat was drilled on November 12 after cotton stalks had been cut to pieces with a tractor-drawn rotary mower, the seedbed ripped, then disked, the grain yielded an average of 33.8 bushels per acre and straw 1.37 tons per acre. On the cornland, handled the same except that ripping was omitted on account of crabgrass, the wheat yield of grain averaged 29.8 bushels per acre and straw 1.25 tons per acre. In both cases, the ground cover of finely chopped cotton or corn stalks did not interfere with grain-drill operations. Excellent stands of wheat were secured. The ripping operation was done to test the field operation of this implement--and 'orchard cultivator'--in chopped-up trashy surface conditions. The trial did not permit a valid comparison of ripping versus no ripping on the wheat yields.

"By comparison with the above a substantially earlier planting of wheat, furrow drilled in cotton middles before the last cotton picking in October 1951, (with the stalks cut down later) yielded 40.1 bushels per acre of grain and 1.59 tons per acre of straw on comparable land. Both the furrow drilling of small grain in cotton middles, and the surface mulching with chopped stalk materials are known to be effective conservation methods that reduced erosion.

"One of our pressing problems in connection with the production of all of our fall-sown grains, grasses, and legumes is concerned with early fall seedbed preparation and planting. The rotary mower or stalk-shredder is a very useful tool for use after summer crops have been harvested. We still need improved methods for establishing stands of cool-weather crops in existing stands of maturing summer row crops, in order that the fall-sown seedlings may make considerable growth before frost in order to go into the winter in a vigorous winter-hardy condition."

Methods of Seeding Sweet Clover with a Companion Crop - F. H. Siddoway, St. Anthony, Idaho

"Exceptionally good stands of sweet clover were obtained in 1951 when seeded with barley and wheat as companion crops. While the fore part of the 1951 growing season was extremely dry and grain yields were low, the late July and August rains made growing conditions ideal for the sweet clover. After the grain crop was harvested, the sweet clover reached a height of from 4 to 8 inches depending on seeding method used for establishment. The sweet-clover growth the seeding year was much more vigorous when seeded alone or in alternate rows with spring grain than when seeded solid or broadcast with spring grain. This vigor was reflected the following year when the sweet clover was plowed for green manure. Yield samples were taken June 9, 1952, just prior to plowing.

"The sweet-clover plots that were seeded alone were on fallow as were the sweet-clover plots seeded with a grain crop. Judging from the yields, seeding the sweet clover in alternate rows with the grain reduced competition sufficiently so yields compared favorably with sweet clover seeded alone. Sweet clover yields seeded with barley were not as high as when seeded with wheat. This difference can be attributed to variation between plots. Actually there is no indication one spring grain is superior to another.

"Sweet clover was also seeded with winter wheat by late fall broadcasting and early spring drilling. Good seedling stands were obtained in both instances. However, the sweet clover did not withstand the excessive competition from the winter wheat during the spring of 1951 and no sweet-clover plants survived."

Soil Erosion Practices - T. L. Copley, Raleigh, N. C.

Crop Condition--"With the first half of May being very seasonable crops on the station grew off to an excellent start and made good early growth. The drought condition, beginning the last of May has continued through June, except for a medium rain June 15-17. Our tobacco at the end of June is in serious condition, dwarfed in size with much premature blooming and firing. In addition, the above 100-degree temperatures of June 25-28 caused widespread leaf scalding.

"We have previously estimated that under current tobacco-acre values rainfall or supplemental irrigation is worth \$100.00 per inch per acre if occurring at approximately weekly intervals. Observations this year would indicate that our estimate is not far wrong. We are now short at least four 1-inch rains since the middle of May and the value of our tobacco crop has obviously been cut at least \$400.00 per acre by the dry weather. Supplemental irrigation on bright tobacco should be as profitable--if not more so--as for any other crop in the Southeast.

Mulch Balk Notes--Tobacco planted between mulch balk middles again grew off well this year and continues to look as well as with any other treatments. There is some indication that the young tobacco plants grow off slightly better between the narrow rows of maturing rye, as if the rye was providing some protection against wind and rapid evaporation. This suggests that a similar practice might be effective in certain areas of this State where wind erosion is a problem.

"On a small, nonexperimental area of tobacco land informal trials were made of different methods of producing mulch-balk material. Following 1951 wheat stubble the land was disked and 4-foot rows of rye were seeded last October. This was done by stopping up five spouts of a grain drill with 8-inch spacing, seeding the row of rye with the sixth spout. These rows of rye were top dressed with nitrogen during March and even with such a light seeding a heavy growth resulted. Maturity was delayed and there was more vegetative growth than necessary, resulting in noticeable competition with the tobacco prior to lay-by time. Adjacent to the fall seeded rows of rye, spring oats were seeded in rows in March and this made satisfactory growth. These seedings indicated that both of these methods are good possibilities for producing mulch-balk vegetation. They also indicated that an early maturing grain is desirable and that a large amount of material is not necessary. A small amount to be scattered along the row middle at the last cultivation appears very effective."

Yields from Pasture Experiments - D. D. Smith, Columbia, Mo.

"Dry weather is having its effect on the growth on all pastures. Bromegrass has made the best production to date, with 225 pounds of beef per acre on a plot which receives ammonium nitrate, and 179 pounds on a plot with Ladino clover. This latter plot produced 1493 pounds of beef per acre in 1951, but winter damage to the clover and dry weather in June are holding production down this year. Orchard grass was making the best growth at the end of June of any grass under study. Kentucky bluegrass was almost dormant, though alta fescue and bromegrass continue some growth.

"Alta fescue seed and hay have been harvested from the winter-pasture plot, but production values are not available. Seed yield will be much below the 584 pounds of recleaned seed produced per acre in 1951. The grass showed nitrogen deficiency all spring, and much of the seed was lost by shattering. Complete data will be available by the end of July."

Stubble-Mulch Experiments - C. J. Whitfield, Amarillo, Tex.

"Plots in fallow with different types of tillage were sampled for soil moisture on June 11, affording a measure of the relative amounts of available soil moisture accumulated by these plots since last sampled soon after harvest, on July 19, 1951.

"The amount of available moisture accumulated ranged from 1.06 inches on delayed subtilled fallow, which supported a growth of weeds in the fall, to 2.36 inches on conventional subtilled fallow with fall cultivation to control weeds. During this 11-month period, a total of 12.63 inches of precipitation was received so that the amount of moisture stored was only from 8 to 19 percent of the precipitation compared to the long-time average which is in the neighborhood of 20 percent of the precipitation. The explanation of the poor storage of moisture so far during the 1951-52 fallow season probably lies in the fact that so much of the precipitation was not effective, occurring in showers totaling less than 1/2 inch in a 48-hour period. Applying this criterion, 7.94 inches of the precipitation could be considered effective and from 14 to 30 percent of the effective precipitation was conserved as soil moisture.

"A measure of spring storage of moisture was afforded on some subtilled former legume and wheat plots now in fallow between the sampling dates of February 27 and June 5.

"During this period of time, 6.41 inches of rainfall occurred, 4.14 inches of which would be considered effective. From 13 to 16 percent of the total rainfall occurring during this period was saved as soil moisture, or 20 to 34 percent of the effective rainfall. Measurements such as these serve to illustrate the relative inefficiency of the fallowing practice for moisture storage in the Southern High Plains."

Pasture Experiments - J. Vicente-Chandler, Rio Piedras, Puerto Rico

"After 2 years it is clear that the rotationally grazed kudzu-molassesgrass pastures are producing much higher yields of beef than those under permanent grazing. With the former system it is relatively easy to establish and maintain a uniform, desirable species balance, even when the initial stand is very uneven. With permanent grazing, uniformity of the initial stand is apparently very important. Pastures No. 4 and 5 (rotationally grazed) and No. 3 (permanently grazed) had a rather uniform initial species balance. A desirable species balance has been established and maintained with careful management in these pastures. Pasture No. 1 (permanently grazed) and No. 2 (rotationally grazed) had areas where only molassesgrass was growing at the start of the trials. A desirable, even species balance has been established in pasture No. 2. In pasture No. 1, despite careful management, the animals have overgrazed the areas having kudzu to the extent that it has almost disappeared. This pasture is now composed almost entirely of molassesgrass and beef gains have dropped off considerably. With any system, repeated overgrazing must be carefully avoided. However, occasional heavy grazing of pastures in a

rotation is not harmful."

Plaster and Nylon Electrical Resistance Blocks and Tensiometers Records - R. M. Smith, Temple, Tex.

"Records have been kept on plaster and nylon electrical resistance blocks and on tensiometers at several locations. The readings are being used as a guide to water need in corn-production experiments where some plots receive supplemental irrigation. The depth of water penetration after irrigation or rain, and the layers from which plant roots are drawing most of their water, can also be detected. In the laboratory, moisture retention by various soil samples at several points on pF curves (i. e. moisture held with different degrees of intensity) is being determined. Water-column tension is used to get values for moist or wet conditions, the moisture-equivalent centrifuge for the intermediate moisture range; and pressure-plate equipment for measurements in the wilting range. The slowness of wetting by some samples, especially complete 3-inch cores, seems to account for certain inconsistencies between laboratory and field results. Long laboratory wetting periods seem necessary with Blackland soils in order to reach equilibrium values. These laboratory studies are an essential part of the calibration and use of resistance units and tensiometers in the field. Soil-conductivity determinations are also being made to evaluate the possible salt effects on moisture availability and resistance readings."

Soil Erosion Practices - H. L. Borst, Wooster, Ohio

"The tillage work at Columbus was revised to include three plots (treatments) planted with the International mulch planter.

"A series of 11 temporary (seasonal) runoff plots were installed for the evaluation of Krilium, Ultrawet, and manure as an erosion-control treatment. Various rates and depths of applications of Krilium were made.

"The mulch-tilled corn in experiment 32 (soil prepared with Graham Hoeme plow) is gaining on the corn on plowed ground and shows less evidence of drought damage.

"The plots in the tillage and manure series which were treated with Krilium are very outstanding. The corn has a darker green color and is several inches taller than the "no-Krilium" corn. This unexpected effect of Krilium is also evident on the runoff plots.

"The corn at Columbus planted with the mulch-planter is more vigorous than the corn on the check plots planted on plowed ground.

"No erosion measurements have been obtained from the runoff plots--no rain."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio

"Two storms during the last week of June, each over an inch in amount, came at high rates and caused runoff and erosion from corn watersheds as given below:

Corn Watersheds							
Watershed		June 24			June 29		
No.	Treatment	Rain	Runoff	Erosion	Rain	Runoff	Erosion
		Inches	Inches	Lbs./acre	Inches	Inches	Lbs./acre
106	Normal, straight row	1.49	0.21	396	1.25	0.45	2,068
121	Conservation, contour	1.49	.06	48	1.25	.15	71
188	Mulch, contour	1.39	0	0	1.21	0	0
191	Krilium, contour	1.39	.001	0	1.21	0	0

"A large amount of our first cutting of meadow was put into field stacks for silage as indicated below:

1. Long grass silage stack 40 feet long, 16 feet wide, and depth ranging from 5 feet at one end to 9 feet at the other. Materials used were orchard grass-timothy-alfalfa mixture, Reed canary grass, and Bromegrass-alfalfa mixture. A rear-mounted buck rake and a hay loader with trailer were used to bring in the unwilted material to the stack. The former was much more efficient than the latter. Packing the material in the stack with a rubber-tired tractor continued steadily as the grass was added to the top of stack. When finished, there was 100 tons of wet grass in the stack. One-third of the top was covered with saw dust, one-third with Sisalkraft paper, and the remainder was uncovered. One side of the stack is protected by a 3-foot high soil berm. The other side is open. Temperature records are obtained at different points in the stack by soil thermographs. Moisture data are obtained by fiberglass moisture blocks.
2. Chopped grass silage stack 12 feet wide, 40 feet long, and about 6 feet high. Boards to a height of 5 feet make up the two sides and one end. Packing to a depth of nearly 5 feet was accomplished by a rubber-tired tractor. The top was trampled by foot. A total of 60 tons of chopped hay (timothy-red clover-alsike and bromegrass-alfalfa mixtures) was placed in the stack. Top cover was accomplished with sisalkraft paper. A temperature recording instrument was installed at two different places in the stack.
3. Twenty tons of partly wilted chopped grass was blown into a tower silo using liquid sulphur dioxide as a preservative.

"All silage work was performed in cooperation with Dr. Charles Rogers of the Ohio Agricultural Experiment Station at Wooster. Dr. Baker, Agricultural Economist, and William Johnson, Agricultural Engineer, also showed active interest in this work. Walter Weiss, Zone Conservationist in Milwaukee, initiated interest in stack silage in this area. This is not one of our research projects, but is to help supply SCS Operations with some observational information."

Hydrologic Studies - R. W. Baird, Blacklands Experimental Watershed, Waco, Tex.

"The harvest of oats has been completed and yields are the best that has been measured here since the project was started. Conservation practices apparently have shown appraisable increase in oats yield, as shown in the following tabulation:

Oats Yields

Variety	Government operated land	
	Improved practices Bushels per acre	Ordinary practices Bushels per acre
Mustang	57.14	43.26
New Nortex	54.06	-----
Variety	Tenant operated land	
	Improved practices Bushels per acre	Ordinary practices Bushels per acre
Mustang	-----	-----
New Nortex	-----	47.03

"The improved practices have included the use of 200 pounds of 16-20-0 fertilizers where oats are grown following corn or grain sorghum and where clover is included with the oats."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebr.

"The first 3 weeks of June was very dry with only 0.17 inch of precipitation. The last 9-day period, however, was quite different during which time 4.43 inches of rainfall was measured at the Meteorological Station. The total precipitation for the month was 4.60 inches which is about 0.7 inch above the long-time average.

"At the Meteorological Station on June 26, the rain totaled 2.72 inches which fell in approximately 3 hours. During this period 1.5 inches fell in 20 minutes. The following table shows the average maximum peak rates of runoff from the small watersheds under different land-use practices:

Table 1.—Average maximum peak rates of runoff from approximately 4-acre watersheds under different land-use practices

CORN		
Straight row	Contoured	Subtilled
<u>In./hr.</u>	<u>In./hr.</u>	<u>In./hr.</u>
7.55	2.04	4.63
OATS		
2.54	1.19	1.08
WHEAT		
3.52	1.88	1.71

"On June 27, corn had reached an average height of from 24 to 32 inches on all the watersheds. The subtilled corn was surface planted compared to listing on the straight row and contoured watersheds.

"The small grains had been harvested. The wheat had an average height of from 22 to 30 inches while the oats was from 14 to 20 inches.

"The average peak rates of runoff from the two straight row corn watersheds was the highest on record at this station. For the past 5 years these watersheds have been farmed continuously in straight rows.

"On June 26, watershed W-3 peaked at 0.48 inch per hour as compared to 0.18 inch per hour at W-5. Watershed W-3 is farmed under prevailing land-use practices while approximately 68 percent of watershed W-5 is terraced."

Hydrologic Studies - A. W. Cooper, Auburn, Ala.

"Wilting point percentage determined this month are reported in table 1.

Table 1.--Wilting point determinations of Alabama soils

Soil type	Location county and farm	Depth inches	Wilting point 15 atmos. % (dry basis)
Orangeburg F.S.L.	Lowndes -- Eiland	0"-6"	4.0
		6"-12"	7.4
		12"-18"	7.8
		18"-24"	7.8
Bell Clay	Dallas - A. F. Caley	0"-6"	21.5
		6"-12"	23.7
		12"-18"	20.2
		18"-24"	23.2
Faceville F.S.L.	Mobile - Williams	0"-6"	3.9
		6"-12"	5.2
		12"-18"	6.7
		18"-24"	8.8
Shubuta	Lowndes -- Eiland	0"-6"	2.6
		6"-12"	3.3
		12"-18"	7.1
		18"-24"	7.3
Sumter Clay	Dallas - A. F. Caley	0"-6"	13.1
		6"-12"	13.1
		12"-18"	13.1
		18"-24"	13.1

*Data obtained jointly by SCS Research and Operations.

"Most of this month was spent working on the irrigation plots. A concrete spillway was poured where the road crosses on the dam of the small irrigation reservoir. A concrete floor was poured in the field laboratory. Soil-moisture samples were taken six times, and the corn and cotton plots were irrigated several times. There is a great deal of difference in the looks of the irrigated and unirrigated crops due to a deficient rainfall this month.

"Difficulty was encountered in getting sufficient water into the Lloyd clay loam soil. The water was pumped at the rate of 0.4 inch/hour, and runoff occurred at the end of 3 hours. It was estimated that a little less than 1 inch of water went into the soil. Slightly more than 0.2 of an inch of water was lost due to evaporation. When runoff started the system was stopped. This caused the frequency period of application to be shorter, which will increase the labor required to move the pipe."

Runoff Studies - N. E. Minshall, Madison, Wis.

"Precipitation at Edwardsville, Ill., was 4.95 inches as compared to a normal of 4.1 inches. A rainfall of 4.34 inches of the total amount fell in a 24-hour period on June 9. The surface runoff as a result of this storm was 2.0 inches on W-II. Peak rates of runoff were: W-II (50 acres)--3 inches per hour; W-IV (290 acres)--0.8 inch per hour.

"On June 17 a new watershed was established on a 670-acre area near Alhambra, Ill., in cooperation with the University of Illinois Agricultural Engineering Department. This installation involves the use of an existing gully-control structure as the measuring weir. A stilling well and recorder were installed above this weir and two recording rain gages were established in the watershed."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minn.

"I attended the American Society of Civil Engineers meeting at Denver, Colo., and, on June 19, presented a paper entitled 'Hydraulic Fundamentals of Closed Conduit Spillways on Steep Slopes.' Subsequently, while on leave, I observed two pipe spillway installations. I do not know who installed them, but something could be learned from both. West of Pinedale, Wyo., two 12-inch corrugated pipes separated sufficiently horizontally so as to act independently were laid close to the surface of the ground. The pipes were horizontal to the edge of a bank, then followed the steep bank and discharged below tailwater. The drop was perhaps 4 to 6 feet. The pipes were barely covered, so that the depth of flow over the invert could not have exceeded perhaps 15 inches without overtopping the dike. It seemed likely that a single pipe, properly installed, would have carried more water than these two pipes. No cutoff walls were used, and both pipes had been dangerously undermined by water passing under them. The other installation was a corrugated bleeder pipe on a stock-water pond just east of Spearfish, S. Dak. Leakage through the riveted joints of this pipe had undermined the end of the pipe. The undermining had not progressed sufficiently to endanger the dam when I saw it, but it did show another reason for insisting on the use of water-tight pipe through earth dams.

"In connection with the straight drop spillway, Mr. Donnelly found it necessary to raise the sides of the test channel so higher tailwater depths could be obtained. This was accomplished, and the tests were continued to determine the effect of high tailwater levels on the point at which the nappe strikes the basin floor. It was necessary to know this point because it is one of the major factors

that govern the basin length. I had developed a formula for the nappe assuming that the nappe was free-falling above tailwater level but continued on a tangent below tailwater level. Mr. Donnelly found that this gave basin lengths longer than were necessary and that for design purposes the point at which the nappe strikes the basin floor can be considered as midway between the points at which a free-falling nappe, after Rouse, and a submerged nappe as determined by my formula strike the basin floor. His check tests, so far, have shown that this method is satisfactory.

"The nappe seems to plunge beneath the tailwater surface when the tailwater level over the crest is less than about the critical depth. At greater tailwater depths, the nappe floats on the tailwater surface. One stilling basin, designed for a tailwater depth above the crest of 0.69 critical depth, performed satisfactorily, the maximum scour in the downstream channel being about 2 feet below the top of the end sill and 15 feet downstream from the end sill. The end sill was 1.6 feet high. The scour at the end sill was somewhat less than the maximum. When the tailwater depth was increased, the nappe floated and a scour hole about 3 feet deep was formed. Mr. Donnelly notes that in all cases of submergence bank conditions are good, the scour is at the centerline of the downstream channel, and the maximum scour is located about 15 feet downstream from the end sill. Rather than lengthen the basin sufficiently to eliminate the scour hole, it seems preferable to tolerate it because of its location well downstream from the stilling basin and because the banks are not damaged."

Supplemental Irrigation in Virginia Agricultural Production - T. W. Edminster, Blacksburg, Va.

"The rainfall for the month totaled 3.26 inches, with 1 inch occurring on June 14 and 1.35 inches on June 28. The first application of 2 inches on the irrigated pasture plots was completed on June 10. The second application was completed on June 27. There is a noticeable difference in the amount of herbage present on the irrigated lots as compared to that on the check lots.

"Both the check and irrigated pasture lots were clipped at a height of approximately 6 inches during the first week of the month.

"On the irrigated control plots, the corn, alfalfa, clover, and burley tobacco plots have received two applications of water. The irrigated clover and wheat plots have been sampled."

Drainage Studies - J. C. Stephens, West Palm Beach, Fla.

"Alan L. Craig reports that in May at the Everglades Experiment Station, test herbicides were applied to the battery jars of *Najas guadelupensis* in the following concentrations:

Orthodichlorobenzene with 5% Triton X-100	100, 300, 500 p.p.m.
Trichlorobenzene with 5% Triton X-100	100, 300, 500 p.p.m.
Regular leaded gasoline with 5% Triton X-100	100, 300, 500 p.p.m.
40% Isopropyl TCA with 5% Triton X-100	7.5, 15 gallons/acre
Sodium 2,4-D active	0.01, 0.1, 1,
	10, 100 p.p.m.
Dead X	100, 500 p.p.m.

"It is too early to evaluate final results, but the chlorinated benzenes and gasoline seem to have satisfactory effect at all tested concentrations. Dead X

apparently is satisfactory at 500 p.p.m.

"The green bean crop in the concrete tanks was flooded by applying water at a rate on 4.50 inches depth in 24 hours, simulating a storm rainfall of 2 years frequency for a calendar year, and 5 years frequency for the November to March bean season. A drainage capacity of 1 inch per day was used and the test conducted in a manner similar to the flooding test on kenaf in October 1951.

"The results can be summarized briefly. The crops grown at 24-inch and 18-inch water tables and drained at the rate of 1 inch per day during the tests survived without significant damage. The crop grown at 12-inch water table and drained 1 inch per day during the test suffered excessive damage. The crops grown at 18-inch and 12-inch water tables and flooded statically did not survive although there was less damage in the 12-inch depth tank. The beans grown at 12-inch water table exhibited more vigorous growth and greater uniformity of plant size than those grown at 18- and 24-inch water tables.

"The results lead to several general conclusions which are almost self-evident. Drainage capacity and water-table depth prior to rainfall are the two chief factors which influence opportunities for high-water damage. A high drainage capacity allows the storm water to be removed more rapidly, thus reducing the maximum flood stage and also the time of flooding. By drawing down water tables in anticipation of a storm, the rise of water in the field can be reduced. The use of a variable water table which increases with the age of the plant, and is modified by weather conditions, is apparently indicated. By maintaining the water table at a relatively high level during the period of germination, especially in periods of deficient rainfall, a more uniform and more vigorous growth may be obtained. As the plant roots develop and penetrate more deeply into the soil, the water-table depth can be increased to give greater protection against flooding.

"Alan L. Craig reports that in June at the Everglades Experiment Station, final evaluation of the herbicides applied to the *Najas guadelupensis* in battery jars on May 26, 1952, showed gasoline to be the most promising control agent. Emulsified regular loaded gasoline in concentrations of 100, 300, and 500 p.p.m. gave 100-percent kill. Orthodichlorobenzene, technical, gave satisfactory results at only 500 p.p.m. Trichlorobenzene gave erratic results and further tests will be necessary to establish its effectiveness. Isopropyl TCA had no effect. The preparation 2,4-D had no appreciable effect in any concentration. Dead-X produced satisfactory kill at only 500 p.p.m."

Drainage Studies - M. H. Gallatin, Homestead, Fla.

"As a whole the rains were pretty well spaced over the month. Total rainfall varied from 1.46 inches to 6.68 inches for the area with an average of all the gages of 4.08 inches, 3.22 inches in 1951, 2.37 inches in 1950, 10.07 inches in 1949, 4.86 inches in 1948, and 17.28 inches in 1947.

"Going over the records of well readings for the area for the past 6 years and comparing them with readings made on June 30, 1952, shows that with the exception of the years 1946, 1947, and 1949 the water table throughout the area on June 30 was about the same as that for the years 1950, 1951, and 1948. A comparison of the water-table readings for the Everglades profile show that the water is about the same as it has been for previous years for this period of the year.

"In connection with water control on the deep marl lands of the Homestead area, on June 5 plots for control of weeds, grass, and brush were laid out at the Highlands water-control plot. The materials used were those which had shown the greatest promises in work carried on by J. C. Stephens, Project Supervisor, SCS West Palm Beach, Fla.

"The materials selected were T. C. A., CMU, and Ammate. The rates of application were for the CMU, 30 and 40 pounds per acre, 60 and 75 pounds per acre of TCA, and 200 and 300 pounds per acre of the Ammate. These materials were applied to quadruplicate plots and will be checked periodically to see what effect these materials will have on the grass, weeds, and brush and also for how long areas treated will remain free of noxious cover. An area of ditch with water about 6 inches deep was sprayed with a mixture of Ammate.

"A check of the plots at the end of the period indicates that while both the heavy rates of CMU and TCA gave good control of the lower growing grasses, it did not completely kill out the higher growing plants. No control or kill was noted in the area where the CMU and Ammate was applied to the ditch area with water 6 inches deep. Records will be kept for a period of time to try to determine which of any of the rates of application and materials are most effective.

"Plots were laid out in the pot hole and Ammate applied to walked-down materials, willows, standing willows and bay. At the end of the period all sprouts on the willows were brown and dead in appearance. The bay tree was, in appearance, dead. These areas will also be checked periodically for a while to see if this material is effective in killing and speeding up decay of woody materials.

"In connection with the conservation of the marl lands, while no samples were collected from the sampling lines, samples brought in by farmers wishing to plant cover crops in the area of contamination showed that the concentration was still about as high as it had been at the last sampling.

"The Highlands line was sampled on June 12 and analysis of the samples collected showed the point of concentration had moved from a point 7.0 miles south of Highlands to a point 6.5 miles south. The chloride front has moved about a half mile north of the point where it had been in May 1951."

Sedimentation Studies - R. Woodburn, State College, Miss.

"Progress was made on the re-activation of the sediment-transport calculations. A series of training computations were performed by Mr. Burford using various assumed conditions of slope, flow, and stream geometry.

"It is of great interest to us to observe how annual transport may vary so widely depending upon the assumptions made for the various conditions. Table 1. This emphasizes the importance of making every attempt to properly identify and assign all factors which enter into these calculations. Our greatest uncertainty is undoubtedly the flow duration curve. Absence of stream-flow data for watersheds of 10 to 100 square miles makes it necessary to use some arbitrary method of securing some sort of F. D. curve for any stream in which we are interested."

Table 1 appears on the next page.

Table 1.--Thompson Creek sand transport trial calculations for training purposes

Slope	Bottom width	Discharge max. peak	D ₆₅	Banks	Transport cu.yd./yr.*
	Feet	Cu.ft./sec.	Feet		
0.00181	50	6,700	0.00133	No banks	207,582
.00181	50	6,700	.00133	Vert. banks	32,942
				$\frac{1}{2} = 0.050$	
.00181	50	4,700	.00133	Vert. banks	22,043
.0010	50	6,700	.00133	Vert. banks	7,095
.0010	50	4,700	.00133	Vert. banks	4,384
.0010	100	6,700	.00133	Vert. banks	12,943

*Transport for 1 full year's flow of approximately 19 inches of watershed runoff with maximum peak as shown.

IRRIGATION ENGINEERING AND WATER CONSERVATION DIVISION

Barley and Lettuce Tests - K. Harris and H. B. Peterson, Phoenix, Ariz.

Barley Tillage Test, Mesa, Ariz. - "It has been thought that the farmers are consistently doing more work in the preparation of their fields for planting than is necessary. This excessive 'working of the soil' reduces the percolation rate of water through the soil and makes an unhealthy soil condition for plant roots. The objective of this test was to compare the effects of five different types of seedbed preparation on the percolation rate of water into the soil. The types of seedbed preparation ranged from complete rough tillage to one which had an unusual amount of work done on it. The treatments were as follows:

- Treatment 1 - Plow, plant, irrigate
- Treatment 2 - Plow, disk, float, irrigate, disk, plant
- Treatment 3 - Plow, disk, irrigate, plant
- Treatment 4 - Plow, irrigate, disk, plant
- Treatment 5 - Plow, irrigate, disk, irrigate, disk plant

"The following information concerns planting time and irrigation dates of the various treatments:

Table 1
PRE-PLANTING IRRIGATION

Date	Treatment				
	1	2	3	4	5
November 27					X
December 20, 1951		X	X	X	X
PLANTING DATES					
January 4, 1952	Planted & irrigated up				
January 8, 1952		X	X	X	X
IRRIGATION DATES					
March 22, 1952	X	X	X	X	X
April 24, 1952	X	X	X	X	X

"The field layout of this experiment is shown below:

Field B

58	Treatment 1
59	Treatment 2
60	Treatment 3
61	Treatment 4
62	Treatment 5
63	Treatment 2
64	Treatment 3
65	Treatment 4
66	Treatment 5
67	Treatment 1
68	Treatment 3
69	Treatment 4
70	Treatment 5
71	Treatment 2
72	Treatment 1
73	Treatment 5
74	Treatment 2
75	Treatment 1
76	Treatment 4
77	Treatment 3

"Core samples were taken on each treatment and from them infiltration rates and apparent specific gravities determined. The following are the results of the data obtained from these samples. Each figure is an average of 10 replications. Pentrometer readings were taken on each treatment. Each of the following pentrometer readings is the average of 20.

Table 2

Treatment	Percolation rates		Apparent specific gravity	Pentrom- eter readings
	Inches per Hour			
	Jan. 29, '52	June 10, '52		
	<u>Avg. 10</u>	<u>Avg. 10</u>	<u>Avg. 10</u>	<u>Avg. 20</u>
#1 Flow, plant, irrigate	0.73	1.11	1.37	34.2
#2 Flow, disk, float irrigate, disk, plant	.25	.41	1.42	45.7
#3 Flow, disk, irrigate, plant	.45	.72	1.43	43.1
#4 Flow, irrigate, disk, plant	.34	.68	1.44	43.5
#5 Flow, irrigate, disk irrigate, disk, plant	.09	.54	1.51	44.3

"The increase in percolation rates from January 29 to June 10 may be attributed to increased root activity of the barley plants. These fibrous roots open up the soil which makes for better intake rate. This increase in intake rate was noted on the silty soils of the Yuma farm as well as the clay loam soils of the Mesa farm.

Table 3.—Yield of barley in pounds per acre

Repli- cation	Treatment				
	1	2	3	4	5
1	4,994	4,637	4,772	4,914	4,464
2	4,908	4,980	4,865	4,729	4,243
3	4,569	4,624	4,126	4,372	4,483
Average	4,824	4,747	4,588	4,672	4,397

Treatment 1 - Plow, plant, irrigate
Treatment 2 - Plow, disk, float, irrigate, disk, plant
Treatment 3 - Plow, disk, irrigate, plant
Treatment 4 - Plow, irrigate, disk, plant
Treatment 5 - Plow, irrigate, disk, irrigate, disk

"Statistically, these results are not significant even though the rough treatment does show the highest yield. One thing that is of prime importance is that the rough-tilled plots produced as good or better yields than the other treatments and cost from \$3-\$5 less per acre in seedbed preparation. At the present time, the plots of the rough-tilled land are in much better physical condition than are the other plots."

Barley Tillage Test, Yuma, Ariz. - "This experiment is similar to the one conducted on the University of Arizona Experiment Farm at Mesa, Ariz. It is thought that it is unnecessary to do all the work presently being done by many farmers in seedbed preparation. The objective of this test was to compare the effects of four different types of seedbed preparation on the percolation rate of water through the soil. The types of seedbed preparation ranged from one of maximum rough tillage to one having an unusual amount of work done in seedbed preparation. The treatments were as follows:

Treatment 1 - Plow, plant, irrigate
Treatment 2 - Plow, disk, float, irrigate, harrow,
disk, plant
Treatment 3 - Plow, irrigate, harrow, disk, plant
Treatment 4 - Plow, irrigate, float, plant

"The following data concerns the planting time and irrigation dates of the various treatments:

Table 1

PRE-PLANTING IRRIGATION

Date	Treatment			
	1	2	3	4
December 14, 1951		X	X	X
PLANTING DATA				
January 8, 1952		X	X	X
January 10, 1952	Planted & irrigated up			
IRRIGATION DATA				
February 27, 1952	X	X	X	X
April 17, 1952	X	X	X	X

"The field layout of this experiment is shown below:

Field 9C

Treatment 1
Treatment 3
Treatment 2
Treatment 4
Treatment 3
Treatment 4
Treatment 2
Treatment 1
Treatment 4
Treatment 2
Treatment 1
Treatment 3

Treatment 1 - Plow, plant, irrigate
 Treatment 2 - Plow, disk, float, irrigate, disk, plant.
 Treatment 3 - Plow, irrigate, harrow, disk, plant
 Treatment 4 - Plow, irrigate, float, plant

"Infiltration rates were determined twice during the year on the various treatments by means of 8-inch infiltration rings. Each of the following infiltration rates is the average of between six and nine replications. Each of the following pentrometer readings is the average of 12 readings.

Table 2 appears on the next page.

"The increase in infiltration rates from April 15 to June 2 may be attributed to increased root activity of the barley plants. These fibrous roots open up the soil and make for better intake rate. This increased intake rate was noticed on the clay loam soils of the University of Arizona Experiment Farm at Mesa, Ariz.

Table 2

Treatment	Infiltration rates Inches per Hour		Pentrometer readings
	Apr. 15, 1952	June 2, 1952	
#1 Plow, plant, irrigate	0.35	0.59	35
#2 Plow, disk, float, irrigate, harrow, disk, plant	.09	.28	49
#3 Plow, irrigate, harrow, disk, plant	.07	.28	46
#4 Plow, irrigate, float, plant	.21	.26	42

Table 3.--Yield of barley in pounds per acre

	Treatment			
	1	2	3	4
	5,380	5,902	5,532	4,487
	4,269	4,704	5,118	5,075
	4,944	5,227	5,358	4,184
Average	4,864	5,278	5,336	4,915

Treatment 1 - Plow, plant, irrigate
 Treatment 2 - Plow, disk, float, irrigate, disk, plant
 Treatment 3 - Plow, irrigate, Harrow, disk, plant
 Treatment 4 - Plow, irrigate, float, plant

"Barley will be planted on these plots one more year."

Barley Irrigation Test, Mesa, Ariz. - "This test was set up to determine the test time to apply water during the winter months. The barley was not planted until January 8, so an irrigation could not be given during the coldest weather. The earliest practical date to irrigate was on February 12. The irrigation given on this date stunted the growth for some time. If the grain had been planted in November or December, an irrigation could have been given during early January and probably more conclusive results would have been obtained.

"Table 1 gives the dates of irrigation and dates of planting for the various treatments. This table appears on the next page.

"The field layout of this experiment is also shown on the next page.

Table 1

Date	Treatment		
	1	2	3
December 20, 1951	Pre-planting irrigation, all plots		
January 8, 1952	All plots planted		
DATES OF IRRIGATION			
February 12, 1952		X	
March 4, 1952			X
March 22, 1952	X		
April 13, 1952	X	X	X
May 14, 1952	X	X	X

Field B

78	Treatment 2
79	Treatment 1
80	Treatment 3
81	Treatment 1
82	Treatment 2
83	Treatment 3
84	Treatment 1
85	Treatment 3
86	Treatment 2
87	Treatment 3
88	Treatment 2
89	Treatment 1

"Soil samples were taken at weekly intervals and the consumptive use determined. In this sampling, the upper 4 inches were eliminated so these results give only the transpiration use.

"Tables 2 and 3 give the transpiration use. Table 2 gives the monthly water use by barley plants in inches per foot of depth of soil. It does not include evaporation losses. Table 3 shows the water use by barley plants in acre-inches per acre per month and irrigation water requirements, and probable amount of water retained in the root zone.

Table 2

Month	Water use - inches						Total
	0'-1'	1'-2'	2'-3'	3'-4'	4'-5'	5'-6'	
January	0.48	0.50	0.42	0.10	0.06	0.00	1.6
February	.57	.62	.50	.13	.05	0	1.9
March	1.15	1.07	.88	.55	.29	.13	4.1
April	1.86	1.52	1.38	1.27	.71	.47	7.2
May	1.51	1.26	1.36	1.38	.89	.76	7.1
Total	5.57	4.97	4.54	3.43	2.00	1.36	21.9

Table 3

Month	Water used		Irrigation		Probable amt. of water retained in root zone
	by plants		water requirements		
	Acre	In./Acre	Acre	In. Acre	
December				12.0	9.0
January		1.6			
February		1.9			
March		4.1		6.0	4.5
April		7.2		6.0	4.5
May		7.1		6.0	4.5
Total		21.9		30.0	

"It appears from the soil samples taken that the irrigation given on May 14 did not contribute to the transpiration of the plants, as soil samples taken after the barley was harvested showed a moisture content of near field capacity.

"Table 4 gives the yield data.

Table 4.--Yield of barley pounds per acre

IRRIGATION TREATMENT

#1	#2 Irrigated	#3 Irrigated
March 22, April 13, May 14	February 12, Apr. 13, May 14	March 4, April 13 May 14
3,479	3,060	3,233
3,399	2,660	2,925
3,393	3,140	3,719
2,518	2,463	3,196
Avg. 3,197	2,831	3,268

"More from field observations of the plots rather than from the yield data, it appears that the irrigation given on February 12 held back the growth of the plants about 10 days. During the remainder of the season, these plots about made up the retardation in growth. This test did not prove anything as far as yield of grain is concerned. Had the barley been pastured, in all probability the early irrigation would not have produced as much feed."

Barley After Sorghum Test, Mesa, Ariz. - "It has long been observed that whenever grain has been planted following a sorghum crop, a poor yield always results unless fertilizers are used. This test was set up to see if tillage operations, which would let the water move readily through the soil, would yield a satisfactory barley crop with the use of fertilizers.

"The treatments are described below. Three replications of each were made.

- Treatment 1 - Disk, plant, irrigate
- Treatment 2 - Same as 1 plus fertilizer

Treatment 3 - Disk, plow, plant, irrigate
 Treatment 4 - Same as 3 plus fertilizer
 Treatment 5 - Disk, plow, disk, plant, irrigate
 Treatment 6 - Same as 5 plus fertilizer
 Treatment 7 - Disk, plow, irrigate, disk, harrow, plant
 Treatment 8 - Same as 7 plus fertilizer
 Treatment 9 - Disk, plow, disk, irrigate, harrow, plant
 Treatment 10 - Same as 9 plus fertilizer

"The field layout of the experiment is shown below:

Grain After Sorghum Test 1952
 Field G

W-1/2-4	Treatment 5
E-1/2-4	Treatment 10
W-1/2-5	Treatment 9
E-1/2-5	Treatment 8
W-1/2-6	Treatment 7
E-1/2-6	Treatment 6
W-1/2-7	Treatment 9
E-1/2-7	Treatment 8
W-1/2-8	Treatment 7
E-1/2-8	Treatment 10
W-1/2-9	Treatment 5
E-1/2-9	Treatment 6
W-1/2-10	Treatment 7
E-1/2-10	Treatment 10
W-1/2-11	Treatment 9
E-1/2-11	Treatment 5
W-1/2-12	Treatment 8
E-1/2-12	Treatment 6

Field f

E-1/2-7	Treatment 1
W-1/2-8	Treatment 4
E-1/2-8	Treatment 3
W-1/2-9	Treatment 2
E-1/2-9	Treatment 4
W-1/2-10	Treatment 3
E-1/2-10	Treatment 1
W-1/2-11	Treatment 2
E-1/2-11	Treatment 3
W-1/2-12	Treatment 1
E-1/2-12	Treatment 2
W-1/2-13	Treatment 4

"Table 1 gives the infiltration rate of each treatment, and table 2 gives the yield data. These tables appear on the next page.

Table 1.--Infiltration rate in./hr.

	Treatment #1	Treatment #3	Treatment #5	Treatment #7	Treatment #9
1		0.72	0.94	0.50	0.65
2	0.43	.65	1.44	.72	1.01
3	.50	1.08	.79	.79	.65
4	.29	.72		.43	.43
5	.36	.29	.80	.79	.86
6	.36	.29	1.01	.86	.58
Average	0.39	0.63	1.01	0.68	0.70

Treatment #1 - Disk, plant irrigate
 Treatment #3 - Disk, plow, plant, irrigate
 Treatment #5 - Disk, plow, disk, plant irrigate
 Treatment #7 - Disk, plow, irrigate, disk, harrow, plant
 Treatment #9 - Disk, plow, disk, irrigate, harrow, plant

Table 2

NOT FERTILIZED				
Disk, plant, irrigate	Disk, plow, plant, irrigate	Disk, plow, disk, plant, irrigate	Disk, plow, irrigate, disk, harrow, plant	Disk, plow, disk, irri- gate, Harrow plant
491	630	1,007	725	689
472	623	631	822	654
680	762	787	596	845
Avg. 548	672	808	714	729
FERTILIZED				
2,582	2,135	2,002	2,980	3,137
2,072	2,576	1,476	2,292	1,806
2,147	2,462	2,135	2,309	2,072
Avg. 2,267	2,391	1,871	2,527	2,338

"This test brought out the fact that so far a method of tillage has not been worked out where grain may follow sorghums and still get a satisfactory yield without the use of fertilizers."

Lettuce Tillage Experiment, Mesa, Ariz. - "It has been thought for some time that vegetable farmers of the Salt River Valley are doing more work than is necessary in the preparation of a seedbed. It has been generally believed that delicate vegetable seeds must be planted in a powdered seedbed, or a good stand will not result. To get this powdered seedbed, it is necessary to complete a series of disking and floating operations prior to planting. It has been observed that whenever the surface soil has been pulverized, the water-intake rate has been greatly reduced.

"This experiment was set up to show that it is possible to get a good stand of lettuce on rough-tilled land. It was also planned to show how rough tillage improved the water-intake rate of the soil, and made healthier plants and soil conditions.

"The test was set up on 2 acres of Field A at the University of Arizona Mesa Farm. Three treatments were used and four replications of each treatment made. The treatments were as follows:

- A - Plow 15"-18"
- B - Double Disk, double float
- C - Plow 15"-18", disk, float

"After the completion of these tillage operations, the area was furrowed out in 40-inch beds, planted, and irrigated up.

"It was noted when irrigating these plots that the rough or 'A' treatment took much longer to sub up than did the 'B,' or smooth treatment. Perfect stands were obtained on the rough as well as the smooth-tilled plots.

"Plot layout is shown below:

	B
	C
	A
	B
	A
	C
	A
	C
	B
	C
	B
	A

Types of seedbed preparation:

- A - Deep plow 12"-15"
- B - Double disk and float
- C - Plow, disk, and float

"Core samples were taken in the smooth and rough-tilled plots twice during the season. From these samples percolation rates were determined. Following are the results of the percolation data determined by core samples:

Table 1
(Each figure is the average of 6 replications)

Date of sampling	Depth : inches	Infiltration rate (inches/hour)	
		Treatment A plow, furrow, plant, irrigate	Treatment B double disk, double float, furrow out, plant, irrigate
Mar. 11, '52	2-5	0.24	0.04
	6-9	.39	.16
	12-15	3.70	4.20
May 12, '52	2-5	.18	.03
	6-9	.32	.14
	12-15	3.90	4.20

"Yield data for each treatment is tabulated below as crates per acre for each treatment.

Table 2

Treatment	Yield (crates/acre)		
	#4 size heads	#5 size heads	Total marketable heads
A - Plow, furrow, plant, irrigate	67	102	169
B - Double disk, double float, furrow, plant, irrigate	65	91	156
C - Plow, disk, float, furrow, plant, irrigate	83	116	199

"Apparently there were some beneficial affects of plowing, then disking the field, instead of the conventional method of many diskings and floatings. This test should be continued next year on the Mesa Farm. It was learned that lettuce can be planted in a rough seedbed with beneficial results."

Lettuce-Tillage Experiment, Yuma Valley, Ariz. - "The layout of this experiment is similar to the one set up at the University of Arizona Experiment Farm at Mesa, Ariz., and is shown in the general layout of the lettuce-tillage experiment. The treatments were as follows:

- A - Plow 15"-18"
- B - Double disk, double float
- C - Plow 15"-18", disk, float

"After completion of these tillage operations, the area was furrowed out in 40-inch beds running north and south, planted and irrigated up.

"At the beginning of the season a trip was made to Yuma and several personal observations made at that time,

1. Plots which were disked only and not plowed deep had an abundance of weeds. Those which had been deep-plowed had practically no weeds.
2. Plots which were plowed only, took about four times as long to sub up as did the smooth-tilled plots.

"Perfect stands were obtained on the rough as well as the smooth-tilled plots. Infiltration rates were determined by the use of 8-inch infiltration rings. These results are as follows:

Table 1

Treatment	Infiltration rate Inches/Hour
A - Deep plow, furrow out, plant, irrigate up	0.26
B - Double disk, double float, furrow out, plant, irrigate up	.11
C - Deep plow, disk, float, furrow out, plant, irrigate up.	.22

A	B	C	B	C	A	C	A	B
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B	C	A	C	A	B	A	B	C
---	---	---	---	---	---	---	---	---

Types of seedbed preparation:

A - Plow 12"-15"

B - Double disk and float

C - Plow, disk and float

"Yield data showed that the rough-tilled plots had a greater percentage of marketable heads per plot than did the other two treatments.

Table 2

Percent marketable heads

Row	Treatment A (Plow)	Treatment B (double disk, double float)	Treatment C (plow, disk, float)
1	61.0	57.8	50.0
2	50.0	63.4	43.6
3	69.6	62.8	74.5
4	69.8	70.5	60.2
5	71.0	57.5	71.3
6	63.5	54.8	53.9
Average	64.9	61.1	58.7

"This experiment should very definitely be carried on next year on this farm."

Replenishment of Underground Aquifers, San Joaquin Valley - L. Schiff and C. E. Johnson, and E. S. Bliss, Bakersfield, Calif.

L. Schiff - "Six 9-inch infiltrometers were operated over a period of about 28 days. Three were then treated with Ultrawet and all six continued in operation, table below. After wetting (1 day) and a drying period (1 month), results of the effect of Krilium and Pumice are also shown in the table.

Table 1.--Effect of Krilium, Pumice, and Ultrawet on infiltration rates (ft./day)

Days:Pond (.005 ac): Pond 19 (.005 ac):Pond 14(.005 ac):9" infiltrometers						
: no treatment :		Krillium	:	Pumice	:Ultrawet:No treat.	
1	2.2	2.2		2.3	1.4	1.2
2	2.3	3.7		2.7	1.2	1.0
3	2.4	3.2		2.4	1.1	1.0
4	2.6	3.4		2.4	1.1	.9
5	2.8	3.3		2.4	-	-
6	3.0	3.4		2.6	-	-
7	3.1	3.5		2.6	1.2	.9
8	3.2	3.7		-	1.3	1.1
9	3.3	3.8		-	1.3	1.0
10	3.4	-		3.0	1.2	1.0
11	3.5	-		3.5	1.1	.9
12	3.6	4.2		3.8		
13	3.5	4.8		4.2		
14	3.4	5.2		4.7		
15	3.3	5.4				
16	3.2	6.3				

Definite improvement trends for Krilium and Pumice (to be continued).

C. E. Johnson - "Results of the Ultrawet are given in this test. Ultrawet was applied to three of six 9-inch infiltrometers which had been flooded for 28 days. Ultrawet was added at the rate of 50 pounds per acre by dissolving the required amount in the water contained in each infiltrometer treated. Krilium was applied to one 0.005-acre test pond at the rate of 0.1 percent by weight mixed into the top 3 inches of soil. Pumice was mixed with the top 3 inches of another 0.005-acre test pond at the rate of 20 percent by volume. Results to date indicate the Ultrawet to have had no significant effect."

E. S. Bliss - "Water spreading being carried on by the North Kern Water Storage District at the Poso and Rosedale Ranch areas was discontinued as of June 30 in order to dry up the surface soils and thus increase infiltration rates. Bermuda grass will probably be sown over part of the area as a surface treatment. Rates for the large areas have not yet been calculated but they have been disappointingly low. Data for the six double ring infiltrometers at Poso have been worked up and are probably indicative of rates occurring over much of the large pond area. Three of these infiltrometers consisting of an outer ring 2.3 feet in diameter and an inner ring 12 inches in diameter were driven 3 inches into each of two soil types within the flooded area. Water averages 0.8 to 1.2 feet deep

throughout the pond area. Table 1 below shows results of these runs. The 'Good' area has a loamy sand surface and the 'Poor' area is a fairly heavy sandy loam.

Table 1.--Infiltration rates, Poso spreading area infiltrometers, feet depth of water per day

Day	Good area		Poor area	
	Inner ring	Outer ring	Inner ring	Outer ring
1	1.14	1.76	0.18	0.32
3	.90	1.39	.10	.29
7	1.10	1.31	.17	.20
15	.58	.30	.10	.13
28	.14	.15	.10	--

"Soils of the Poso area are recent alluvial deposits, highly stratified but with few 'barrier' layers anywhere within the surface 20 feet. The very low infiltration rates can be explained on the basis of surface conditions, however. The area was prepared for water spreading in March of this year by leveling the basins and putting up contour dykes between them, using carry-alls, tractors, and bulldozers. Unusually heavy and persistent rains occurred through much of March, putting the soil in ideal condition for puddling under the heavy equipment. Data in table 2 below bring out the effect of this treatment in terms of volume weights and percolation rates on undisturbed soil cores taken just prior to turning water into the basins. For contrast similar measurements are shown on cores obtained in a field just beyond the leveled area."

Table 2.--Poso water-spreading area percolation rates versus volume weights for undisturbed soil cores

Depth :	Leveled area						Undisturbed area			
	Poor 1/			Good 1/			Good 1/			
	Per.rate,cc/hr.	Vol.wt.		Per.rate,cc/hr.	Vol.wt.		Per.rate,cc/hr.	Vol.wt.		
	:Initial:After 24:gm./cc.	:Initial:After 24:gm./cc.		:Initial:After 24:gm./cc.	:Initial:After 24:gm./cc.		:Initial:After 24:gm./cc.	:Initial:After 24:gm./cc.		
	:hrs.soak:			:hrs.soak:			:hrs.soak:			
0-3	30	22	1.84	50	50	1.73	940	640	1.22	
3-6	130	30	1.82	20	10	1.74	550	580	1.38	
9-12	150	44	1.78	204	160	1.61	200	250	1.45	
16-19	192	78	1.76	96	104	1.51	236	260	1.40	

1/'Good' area has loamy sand surface and 'Poor' area has heavy sandy loam surface.

Irrigation Water Management and Drainage Practices in the Production of Hay and Forage in the High Mountain Valleys of Colorado - H. K. Rouse, Gunnison, Colo.

"Under the change on plots A from continuous flood irrigation to flood irrigation at intervals when soil-moisture tension reaches 2 atmospheres, the more desirable vegetation--grasses and legumes--appears to be making a come back while

the sedges and rushes no longer seem to be dominant. In general, both grasses and clovers appear to have made considerably greater growth this year than in either 1950 or 1951. Both moisture and daytime temperature conditions have been favorable although minimum temperatures have been normal or below with a 26-degree minimum on June 28."

Consumptive-Use Studies and Sprinkler-Irrigation Studies - C. H. Pair, Boise, Idaho

"Estimates of Irrigation Water Requirements for Crops in North Dakota' by Sterling Davis, Norman Evans, and Arlon G. Hazen was published by the North Dakota Agricultural Experiment Station in cooperation with the Division of Irrigation Engineering and Water Conservation, SCS, as Station Bulletin No. 377. This bulletin contains estimates of consumptive use and irrigation requirements for crops in various areas of North Dakota.

"Increases in electric power costs have been noted by several farmers whose sprinkler-irrigation system and irrigation operations have varied little in several years' time. This increased power use has been caused in some cases by increased friction in the motor and/or pump bearings or mis-alinement between pump shaft and motor shaft. Increased friction in motor or pump bearings may be caused by wear from use or rust forming on the bearing or shaft during the winter season when pump and motor are not operated for long periods of time. Mis-alinement of pump and motor shafts frequently occurs when pump motor is used to power other equipment. Where kilowatt hour demand watt-meters are used in determining power charges, an indication that such troubles are beginning to occur can be obtained by keeping a monthly record of the kilowatt hour peak demand by the motor. A steady increase in peak demand over a period of time indicates trouble."

High- and Low-Moisture Plot Experiments - W. R. Meyer, Garden City, Kans.

"We have had an extremely hot dry June with 3 weeks of 105° and 108° temperatures accompanied by 25 to 30 miles per hour winds.

"The high-moisture plots were irrigated twice and the low-moisture plots once during the month. We have been running the pump night and day for the past 7 weeks and have not been able to keep the moisture in the high-moisture plots as high as we had hoped. As yet the data on efficiency have not been computed. The high-moisture level plots look considerably better than the low-moisture plots."

Concrete Pipe Line - F. B. Hamilton, Lincoln, Nebr.

"Considerable difficulty has been experienced in securing an acceptable job on the concrete pipe line being laid at the Scottsbluff Experiment Station. The contractor has been required to re-band numerous joints in order to reduce leakage. The problems arising in this construction emphasize the importance of experience and skill in laying concrete pipe.

"The same situation exists on the Bostwick Irrigation Project. The whole matter of the delivery of irrigation water this season through the lateral system hinges on the repair of numerous low-head concrete pipe siphons. These structures failed to meet specifications regarding leakage, and the contractor has been ordered to repair them. Both of these experiences seem to indicate that concrete pipe should be recommended only where experienced and competent contractors are available."

Evapo-transpiration Studies - F. M. Tileston, Ontario, Ore.

"Evapo-transpiration rates for the three crops studied on the farm fields in the Owyhee area have been calculated from about the end of May to about the middle of June, and are presented in table 1. The rates shown are computed on the basis of soil-moisture samples taken at least once a week or oftener on each of the farm fields, and in 14 different locations in each field. The fields are about 4 acres in extent. There has been considerable cool and rainy weather in this area, more so than is normal for this time of year. However, it will be noted that for the alfalfa and clover crops the evapo-transpiration rate is running about 0.13 inch per day up to June 21. Although the corn on the Tip Powers ranch is only about 8 inches high the evapo-transpiration rate has reach about 0.06 inch per day on June 16.

"In the same table is shown the total inches of water used by the various crops to the date shown. It will be noted that the clover and alfalfa each have used about 13 inches of water and the corn has used about 6 inches of water up to about the same date. As soon as the corn begins to grow and irrigation is commenced the evapo-transpiration rate and total used for the corn will be markedly higher."

Table 1

Field	Crop	Total plant use to date		Evapo-transpiration rate	
		including rainfall		Period	In./Day
		Date	Inches		
Wendell Richmond	Alfalfa	June 18	13.10	May 27-June 18	0.11
Tip Powers	Corn	June 16	5.94	May 26-June 16	.07
Orland Cheldelin	Clover	June 21	13.24	May 31-June 21	.13

Irrigation Studies - P. E. Ross, Weslaco, Tex.

"The outfield cotton plots on the H. J. Garrett farm were irrigated on June 17. The pans irrigated were 58 feet wide and 654 feet long. An average head of 3.57 c. f. s. was applied to the cotton furrows for 1 hour and 3 minutes giving a total depth of irrigation of 4.36 inches. The time required for travel on the 654 feet was 44 minutes. The time required for this water to enter the soil was approximately 9 hours. This gave a water-intake rate of approximately 0.50 inch per hour. However, during the last 6 hours the water was on the ground, the rate of water intake averaged 0.20 inch per hour.

"The increase in moisture found in the soil 60 hours after irrigation was as follows:

Feet	Station 1 / 00	Station 3 / 00	Station 5 / 00
	Inches	Inches	Inches
0 - 1	1.78	2.33	1.95
1 - 2	.58	1.58	.90
2 - 3	.16	.47	.36
3 - 4	.40	-.32	.06
Totals	2.92	4.06	3.27

"This gave an over-all efficiency of $3.42 \div 4.36 = 78.4$ percent. If we allow 0.50 inch for transpiration and evaporation during the 60-hour interval we get an efficiency of 88.6 percent.

"Soil samples have been taken from the grass plots on the Garrett farm and sent to Mr. Bloodworth at Texas A & M for a closer examination of the moisture-tension curve on the soils. Mr. Bloodworth has set up facilities to run the curve from 0 to 15 atmospheres on each sample. Each foot to a depth of 5 feet will be run. It is believed that this will help in our soil-moisture studies on these plots.

"The design and layout on the irrigation system of the 80-acre experimental citrus grove on Rio Farms was completed this month and construction is now under way. Approximately one-half the area will be contour benched and the remaining portion will be leveled to grades. The grades on this tract are to vary from 0.00 percent to as high as 0.40 percent in some pans. The pans to be irrigated are generally about 300 feet long and 30 feet wide. The distribution system for the water will be underground concrete pipes with valves for each tree row."

8/29/52

